a considerable time, been their chief sources. Other sources of potassium salts, however, exist in the nitre found in India and in the kelp of the West Highlands, and it seems feasible to suggest that the latter industry should be taken up again, as it furnishes not only potassium salts but also iodine (compare in this connection W. R. Scott, Report to the Board of Agriculture on the kelp industry in the West Highlands, Blue Book, Cd. 7564).

It must not be forgotten that in many cases sodium salts can be used instead of potassium; thus the bromide, chlorate, dichromate, and permanganate of sodium might be manufactured instead of the potassium salts. In this connection it may be as well to point out that there must be a large amount of potassium salts stored in the various universities and technical schools of this country which might be collected, and, where necessary, worked up for the supply of those salts which are needed now for medicinal purposes in hospitals, etc., until a further supply becomes available. The ordinary employment of potassium salts in the laboratory can easily be avoided by the use of sodium salts in almost every case.

An important industry is that of the manufacture of thorium nitrate, which is used so largely for incandescent mantles. Although this compound is already made in England, the supply is not equal to the demand, and there ought to be little difficulty in diverting the chief source, viz., monazite sand, from Brazil to this country.

The manufacture of the large amount of glass chemical apparatus and other articles, such as cylinders for incandescent lamps, hitherto made from the so-called "Jena-glass"—a borosilicate glass containing zinc and barium oxides—ought certainly to be taken up by English glass makers, and the Potteries should seriously consider the question of supplying Berlin porcelain.

Turning now to the organic side of chemical industry there is a very considerable demand for formic acid and formaldehyde and its derivatives used in medicine, such as hexamethylenetetramine (urotropine), but of all organic medicinal drugs perhaps the greatest shortage is in salicylic acid, which is required also in the preparation of certain dyestuffs. Hitherto the world's supply has been provided by a large German works, and the manufacture of such an important substance in this country is very necessary. Provided with this the production of such drugs as salol (the phenyl ester) and aspirin (the acetyl derivatives) is rendered possible. Other acids, such as benzoic, citric, and tartaric, are also needed.

Of other well-known drugs the manufacture of acetanilide and phenolphthalein is easy, whilst that of phenacetin (acetyl-*p*-phenetidine), atophan (2-quinoline-4-carboxylic acid), antipyrine (phenazone), and its various derivatives, sulphonal and its congeners, veronal, the various guaiacol compounds, and the organic arsenic derivatives, such as atoxyl and salvarsan, is more difficult.

Closely allied to many of the above, from the manufacturing point of view, is the large class of photographic developers, amongst which may be mentioned pyrogallol, hydroquinone, and metol (methyl-*p*-aminophenol sulphate), and synthetic perfumes, such as vanillin, artificial musk, ionone, heliotropine, etc.

Efforts will no doubt be made to produce in England the great quantity of organic dyestuffs hitherto imported from Germany. A considerable number has also been provided by Switzerland, and presumably this importation will continue. A large amount of azo-, nitro-, alizarin, and sulphur dyes has been produced for a long time in England, as well as indulines, magenta, aniline blues, methylene blue, etc., and no doubt the manufacture of these is being largely increased, but there is a great field open to the British manufacturer in the case of vat dyes, such as indanthrene, and its derivatives, of which the raw material is already made here, and synthetic indigo and its derivatives, including thioindigo.

J. C. CAIN.

NOTES.

WE regret to see the announcement of the death, at sixty-six years of age, of Dr. W. H. Gaskell, F.R.S., University lecturer in physiology, Cambridge.

THE *Morning Post* announces that the Huxley Memorial Lecture at Charing Cross Hospital on recent advances in science and their bearing on medicine and surgery, by Sir Ronald Ross, originally fixed for October 1, has been postponed to Monday, November 2.

THE death is announced of Mr. H. M. Freear, chemical assistant at the Woburn Experimental Farm and Pot-culture Station of the Royal Agricultural Society, and a leading authority upon the relation of pot-culture experiments to practical agriculture and horticulture.

MR. EDWARD RILEY, whose death is announced, at eighty-three years of age, was early associated with the production of Bessemer steel at the Dowlais Iron Works in South Wales, where he was chemist from 1853 to 1859. At the May meeting of the Iron and Steel Institute this year, he was awarded the Bessemer gold medal in recognition of his work in analytical chemistry and metallurgy.

AN announcement was made in NATURE of June 18 (p. 415) to the effect that Mr. Thomas Cawthron, of Nelson, New Zealand, had made a gift of 50,000*l*. for a beginning for a solar observatory to be erected in New Zealand. Miss Mary Proctor asks us to state that the amount is "30,000*l*. for a beginning," and that she is responsible for the conflicting statements which have been made, as she was "under the mistaken impression that the amount was 50,000*l*., and made a statement to that effect without being duly authorised."

THE death is announced, on September 8, at seventy-four years of age, of Mr. William Erasmus Darwin, eldest son of Charles Darwin. It was with reference to this son that Darwin wrote in his autobiography:—"My first child was born on December 27, 1839, and

I at once commenced to make notes on the first dawn of the various expressions which he exhibited, for I felt convinced, even at this early period, that the most complex and fine shades of expression must all have had a gradual and natural origin." These notes provided a natural explanation of phenomena which appeared to be a difficulty in the way of the acceptance of organic evolution, and they formed the basis of the volume, "Expression of the Emotions in Man and Animals," published in 1872.

FROM Göttingen the news is announced of the death of Prof. Wilhelm Lexis, the economist, whose name is well known to students in connection with the "Handwörterbuch der Staatswissenschaften." Lexis was born on July 17, 1837; matriculated at Bonn in 1855, reading there mathematics and natural science. After graduating he was an assistant master at Bonn until 1861, when he went to Paris to study French economic conditions. Very soon he became known as an authority on economic problems, and in 1872 he was appointed to the chair of political economy at Strassburg. Two years later he was called to Dorpat; thence in 1876 he went to Freiburg, where he remained eight years. In 1884 he moved to Breslau, and in 1887 to Göttingen. Here he taught economics for twenty-five years, retiring in 1912 with a reputation that was world-wide.

SINCE the discovery of well-preserved skeletons of ancestral horses in the Eocene formations of North America, palæontologists have been anxious to compare the skulls of these specimens with one from the London Clay of Harwich, which was described by Owen in 1858 under the name of *Pliolophus vulpiceps*. This fossil, in association with various limb-bones of the same animal, was obtained by the Vicar of Harwich at that time, the Rev. Richard Bull, who gave portions of the upper and lower jaws and some fragments of limb-bones to the British Museum, but retained the greater part of the specimen. Since then it has been lost to science, but it now appears that all the associated remains have been carefully preserved by the widow of the discoverer exactly as he left them, and they have just been presented by Mrs. Richard Bull to the Geological Department of the British Museum (Natural History). The skull of Pliolophus, which still remains unique, is thus again accessible for study and comparison. As pointed out by Mr. R. Lydekker, it is probably referable to a species of Hyracotherium.

THE Smithsonian Institution has issued a treatise on atmospheric air and its relation to tuberculosis, by Dr. Guy Hinsdale, one of the prize essays presented in connection with the Washington Tuberculosis Congress (Publication No. 2254, Smithsonian Miscellaneous Collections). The author does not claim that there is any specific climate for tuberculosis. Of first importance are chemically and bacteriologically pure air and sunshine. One thing to be avoided is a climate in which the humidity varies greatly. Probably the best combination is a low humidity and a moderately cool temperature.

THE Local Government Board has issued a supplement containing a third report on infant mortality dealing with infant mortality in Lancashire, by the medical officer of the Board (Dr. Newsholme), and Drs. Copeman, Manby, Farrar, and Lane-Claypon. This county contains nearly one-seventh of the total population of England and Wales, and it suffers from a rate of infant mortality which is equalled in few other parts of the country. The evidence suggests that the most important factors conducing to this are (1) the continuance of unsatisfactory methods of dealing with excremental and domestic refuse; (2) unsatisfactory conditions of housing; (3) the industrial employment of married women during pregnancy and confinement; (4) a relatively low standard of life, especially among the miners.

To the current number of the *Psychological Review* Mr. W. S. Hunter contributes a paper on the after-effects of seen movement, in which several new observations are recorded. He finds that if the original movement be observed by one eye, and if a stationary surface be afterwards viewed by the resting eye, a faint, but distinct, after-movement is noticeable. This after-effect, however, occurs only when the moving field first regarded consists of parallel lines; it does not occur in the case of a rotating spiral. The writer attributes the illusion in the resting eye to eye-muscle strains arising from inhibition of the reflex tendency to follow moving lines; in conformity with which view he finds that in the case of parallel lines the after-effects are reduced or abolished when the eyes adopt a position of strain. He also notes that the illusion can, in part, be successfully controlled by the subject, and hence concludes that in the case of parallel lines the after-movement is determined by "associative factors" and eye-strain, in addition to the retinal changes which, in the case of the rotating spiral, alone play an important part.

IN the Journal of the Gypsy Lore Society (vol. vii., part iii.) the latest theory of the Indian origin of the Gypsies, that of Prof. A. C. Woolner, is discussed. He arrives at the conclusion that the theory of their origin from the Jats is unsupported by philology, and is opposed by the fundamental differences between the characters of the typical Gypsy and the typical Jat. Their connection with the Kafirs of the Hindu Kush is equally improbable. The physique of the modern Dom is very different from that of the present Gypsy, but both types may have been modified by environment and by intermixture with other tribes. Something is to be said for the view of Mr. H. L. Williams (Journal Gypsy Lore Society, vol. v.), who connects them with the Sansiyas and other criminal nomads of Northern India. On the whole, Prof. Woolner's view that the Indian element in Romani is not homogeneous, and that when this type of speech left Indian soil it already contained elements picked up in different parts of that area. In other words, the Gypsies were originally wanderers, and then, as now, picked up in their wanderings unconsidered trifles in the shape of words and grammatical forms. This seems to be a reasonable view, and the evidence appears to point to a migration of the nucleus of the race from south-east India to the north-west, whence they passed westward from the neighbourhood of Peshawar.

THE seventh annual report of the American Bison Society contains two very satisfactory items—first, that the number of pure-bred bison living in the country at the end of 1913 (inclusive of the 549 calves born the same year) was no fewer than 3788, and, secondly, that the society has decided to include within the scope of its aims the protection of the prongbuck, a species now standing in urgent need of such assistance. It should be added that there is a discrepancy in regard to the number of living bison in different parts of the report, the number given in the president's address being 3453, and that in the summary by the secretary the figure quoted above.

THE imperfections of our seismic records are most noticeable during the periods of great European wars. Accounts of recent earthquakes are, of necessity, rare or brief at the present time; but, in neutral countries, seismological inquiries are being carried on as usual. The weekly bulletins of the Hawaiian volcanic observatory, for instance, record the changes that occur from day to day in its neighbourhood. In the last number (No. 27) Mr. H. O. Wood reports on the earthquakes registered in the Whitney Laboratory of Seismology at Halemaumau from April 21 to July 22, 1914. During these three months sixty-one local shocks were registered, of which only five were perceptible without instrumental aid. The number of shocks is thus at present small for a volcanic centre, but a considerable increase in their frequency will no doubt herald any important outburst.

THE earthquakes of Norway have recently been studied in detail by Mr. C. F. Kolderup (Bergens Museums Aarbok, 1913, pp. 1–152). He gives first a list of the more important earthquakes from 1612 to 1886. After the latter year, the chronicle becomes much more complete. During the twenty-five years 1887–1911, the number recorded is 494, that is, at the rate of nearly twenty a year. In Great Britain the average annual number of earthquakes is twelve; so that, taking area into account, the frequency of earthquakes in the two countries is the same. The Norwegian earthquakes appear, however, to be of greater strength, six having disturbed areas of more than 50,000 square miles, the corresponding number for Great Britain being three. Again, the strongest Norwegian earthquake (that of October 23, 1904) disturbed an area of 367,000 square miles; while the strongest British earthquake (that of December 17, 1896) disturbed 98,000 square miles. In both countries the earthquakes are most frequent during the winter months; and, throughout the day, are most perceptible during the hours 10–11 p.m. and 1–2 a.m.

THE limited literature on iridium in its mineral forms is enriched by Bulletin 17 of the Geological Survey of Tasmania (John Vail, Hobart, 1914), by W. H. Twelvetrees, on "The Bald Hill Osmiridium Field." The mineral occurs here as granules, with magnetite, chromite, nickeliferous pyrrhotine, and gold, in an altered peridotite, and is mostly won from alluvium. From the interesting review of the occurrence and use of iridium in the world at large, we gather that a certain mystery overhangs the trade, since the tipping of nibs for fountain-pens, and the production of hard ends for other apparatus, scarcely account for the increased demand for osmiridium.

RECENT publications of the Geological Survey of the Department of Mines, Tasmania, are concerned with interesting mining areas. Bulletin 14, on "The Middlesex and Mount Claude Mining Field," and 15, on "The Stanley River Tin Field," describe the tin ores that were introduced into metamorphosed pre-Cambrian sediments by the uprise of granite in Devonian times. L. L. Waterhouse concludes that the banded ore-deposits of the Stanley River represent an actual replacement of the original country-rock, the structures of which are often preserved, even in the sulphide-ores. Bulletin 16, on "The Jukes-Darwin Mining Field," contains views of the forest-clad foothills and the great ridges of schist and granite east of Macquarie Harbour. The topography has been notably modified by glacial action.

THE Australian Geological Surveys materially assist in the development of the resources of the country. Since the work that was noticed in NATURE, vol. xciii., p. 307 (May 21, 1914), we have received several publications dealing with mineral deposits. E. C. Saint-Smith and R. A. Farquharson describe the Southern Cross area of the Yilgarn Goldfields (Geol. Surv. W. Australia, Bull. 49), where quartz-reefs occur in a complex country, which includes banded jaspers that may be of sedimentary origin. The most important reefs from an economic point of view occur as metasomatic replacements of schists along shear-zones, while those in the granite from which the siliceous infiltrations spread bear very little gold. The northern part of Kalgoorlie is described in Bulletin 51, and here the ferruginous jaspers, which have so wide an interest among the old rocks of both hemispheres, become in part graphitic as they approach deposits of sulphide ores.

IT has been established by persistent statistical researches that the south-west monsoon rainfall in India is affected by various previous conditions in or outside that area, and seasonal forecasts based thereon have been made with more or less success since 1882. In a recent paper, entitled "A Further Study of Relationships with Indian Monsoon Rainfall" (Memoirs, vol. xxi., part viii.), Dr. Walker discusses at considerable length several correlations from all available data, but the results of this useful investigation have mostly proved to be of a negative character. (*a*) *Relationship with previous barometric pressure in India*: There is a tendency for the pressure of any year to be high when the monsoon is deficient, and *vice versâ*, but the indications do not seem to be of much practical use in forecasting the character of the monsoon a few months before its arrival. (*b*) *Relation with previous Indian temperature*: It is generally admitted that the monsoon rainfall is connected with the replacement of heated air by damper air from the ocean, and that years of high temperature in May should be years of good rainfall, but it is shown that this is not the case. Dr. Walker thinks that improved knowledge of conditions in the upper air will eventually throw light upon the matter. (*c*) *Effect of icebergs in the Southern Ocean*: From an examination of the Meteorological Office tables of icebergs published in the Monthly Meteorological Charts of the Indian Ocean, separately tabulated for each ocean, by Dr. Shaw's direction, it does not appear that the icebergs of the Indian Ocean have any material effect. The data for the South Atlantic appear to be more promising, but no definite conclusion can yet be formed.

THE Indian Association for the Cultivation of Science has republished, as Bulletin No. 10, under the title, "Optical Theories: a Brief Historical Survey," the address delivered by Prof. Mallik at the annual meeting in November last. In sixteen pages the author sketches the development of scientific ideas as to the nature of light from those of the early Greek philosophers to the modern view, according to which it is an electromagnetic phenomenon taking place in an æther through which are distributed singularities of a simple kind known as electrons and of a complex kind known as matter. He shows that at the time the Greeks were discussing the rival theories of Pythagoras, that light consisted of particles projected from luminous bodies to the eye, and of Empedocles, who held that for vision a so-called "visual influence" was necessary in addition, the Indian philosophers were discussing the problem on almost identical lines.

IN Mr. F. W. Lanchester's second article in *Engineering* for September 11, on aircraft in warfare, it is stated that the weaknesses of the dirigible on the defensive are so great and of such a character as to render it quite unfit to remain an active participant in aerial warfare. It may escape for a time, and may render a certain amount of useful service, but only thanks to the circumstance that the number of high-powered, fast-climbing aeroplanes is comparatively limited, and to the fact that scientific methods of attack have not yet been fully worked out or put into practice. However, even to-day the finest of Germany's fleet of Zeppelins would be absolutely at the mercy of a modern aeroplane in the hands of a man prepared to make his one and last sacrifice. So fragile and combustible a contrivance as a dirigible, whether rigid or non-rigid, can never, in Mr. Lanchester's opinion, survive in the face of the rapid development of the modern aeroplane and the engines of offence with which before long it will be furnished.

SOME interesting notes on the relation of rainfall and yield are contributed by Mr. D. Halton Thomson to *Engineering* for September 4. If the annual yield for a given drainage area be plotted against the rainfall for the corresponding period, the points generally are distributed in a haphazard manner, and there is difficulty in drawing a simple curve—usually assumed to be a straight line. The irregularities may be due to inaccurate observations, the varying physical conditions of the drainage area from year to year, and to the fact that the yield lags behind the rainfall. If twenty or more consecutive annual observations are available, the author suggests that the two phenomena may be correlated on the assumption that the rainfall of a given frequency produces a yield of the same frequency. Time-lag and difference of time-distribution may be eliminated by this means. The author derives a formula on this assumption for the Redmires drainage area of the Sheffield Waterworks, and finds $Y = R - 14$, Y being the annual yield and R the annual rainfall, both in inches. The formula for the Trenchford drainage area of the Torquay Waterworks is $Y = 0{\cdot}9R - 13$. In the first case the annual evaporation is 14 in., whatever the rainfall, and in the second case the annual evaporation increases slightly with the rainfall.

THE *Engineer* for September 4 has an article dealing with the problem of pitwood supplies, the dearth of which, brought about by the war, is becoming a matter for serious consideration by colliery companies. Northern Russia, whence important cargoes have been usually shipped, is no longer able to keep up the supply, and scarcity of labour in south-west France has resulted in the suspension of cutting and transporting; shipments from Norway and Sweden are at present impracticable. It seems that only one alternative is to be found if the dearth of pitwood becomes extreme. To most collieries the permanent use of steel would be too expensive. It has been suggested that scrap tubes and rails, cut to suitable lengths, would make good substitutes for pit timber. A midland colliery has used for some time props made from old steel pipes; these are filled with soft and hard wood, the pipes forming a strengthener to the wood portion. This composite prop is lighter and stronger than the ordinary wood prop, is adjustable in length, and by its soft ends gives good warning of a collapse. Our contemporary suggests that the filling in of worked out parts of mines with sand, ash, slag, etc., would lead, among other important advantages, to a diminished demand for timber for pit purposes.

OUR ASTRONOMICAL COLUMN.

COMET 1913*f* (DELAVAN).—Delavan's comet is gradually moving westward among the stars; while it is now best observed in the early morning, it will, towards the end of the month, be an evening object for observation as well. The ephemeris given in this column last week is quite sufficient for anyone to detect this naked-eye object. Those possessing clock-driven equatorials can do useful work by strapping small cameras on to the telescope tube for the photography of the tail. During the evening of September 14 the comet was seen to have brightened very considerably, and was a conspicuous object to the naked eye. It was situated towards the west of θ Ursæ Majoris (3·2 mag.), but a more correct position would be to the west of 31 Ursæ Majoris, and close to this star. In fact, 31 Ursæ Majoris was involved in the tail. The nucleus closely approximated in brightness to υ Ursæ Majoris, a fourth magnitude star.

FURTHER NEWS OF ECLIPSE PARTIES.—The current number of the *Observatory* (September) publishes several items of interest about the parties which went out for the eclipse. It is stated that no news has come to hand about the Cambridge Solar Physics Observatory party, but that Mr. Stratton had been previously recalled for military service, and arrived in England on August 23. Major Hills and Prof. Fowler